

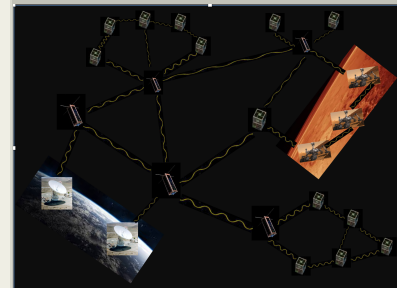
Efficient and Secure Network and Application Communications for Small Spacecraft, Phase I

Completed Technology Project (2017 - 2017)



Project Introduction

For complex missions that are further away from Earth's resources, there is an unmet need for more autonomous operations with minimal Earth contact. Additionally, secure communications and networking topologies at various Quality of Service levels are needed to meet future mission requirements with swarms of small spacecraft. Antara's proposed innovations are: 1) Efficient, secure, mission-configurable, dynamic, and highly scalable key management protocols and 'chipper-suites' for multiple Quality of Service (QoS) Levels. These will include algorithmic optimizations and asynchronous execution methods for the bundle protocol (bp) to augment Delay & Disruption Tolerant Networking solutions based on Interplanetary Overlay Network (ION); 2) Efficient and standards driven adaptation of the Constrained Application Protocol (COAP) over the bundle protocol. The "CoAP over the bundle protocol" (CoAP-over-bp) integration with Antara's security enhanced ION framework will enable secure and scalable low-power application communications systems for clusters of small spacecraft. The innovation will make possible Autonomous and Complex Networks in space at multiple QoS Levels while minimizing the implementation footprint of the inter-networking software, memory, and processing for clusters of spacecraft by infusion with hardware such as space-hardened FPGAs and on the horizon compute technologies. Utilizing the ION framework will lower the cost and the time to develop a high TRL solution and reduce implementation risk. Antara's highly efficient network application communications with key management and cryptographic component innovations will deliver higher security and higher performance relative to existing system technology, support complex and time-varying networks and scale to large networks, via trusted pools in space. Successful implementation of the described innovations will address important technology gaps in NASA TA5.3.



Efficient and Secure Network and Application Communications for Small Spacecraft, Phase I Briefing Chart Image

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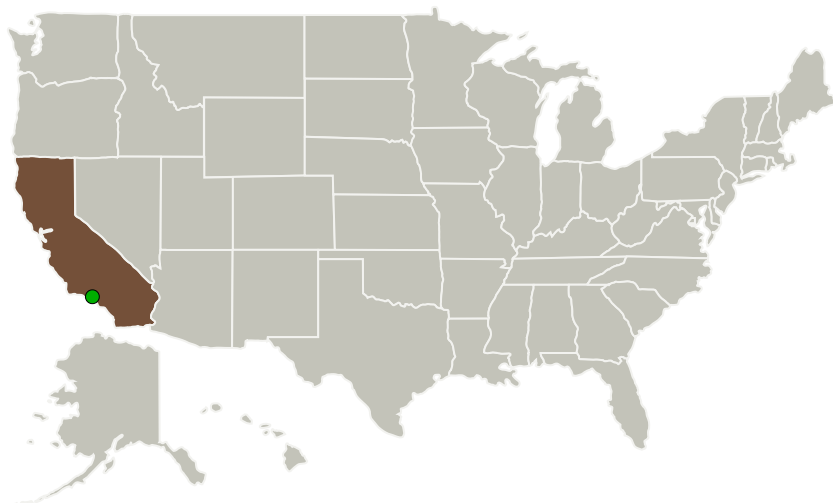
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Antara Teknik, LLC	Lead Organization	Industry	
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations

California

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Antara Teknik, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

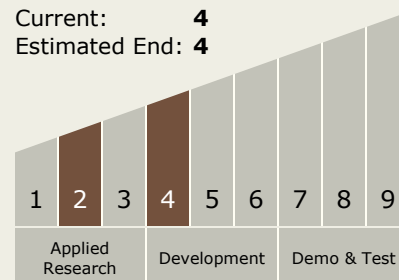
Carlos Torrez

Principal Investigator:

Mehmet Adalier

Technology Maturity (TRL)

Start: 2
Current: 4
Estimated End: 4

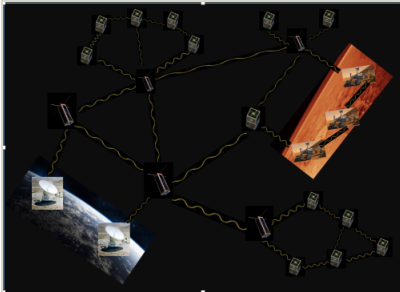


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Images



Briefing Chart Image

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(<https://techport.nasa.gov/image/129681>)

Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
 - └ TX05.3 Internetworking
 - └ TX05.3.3 Information Assurance